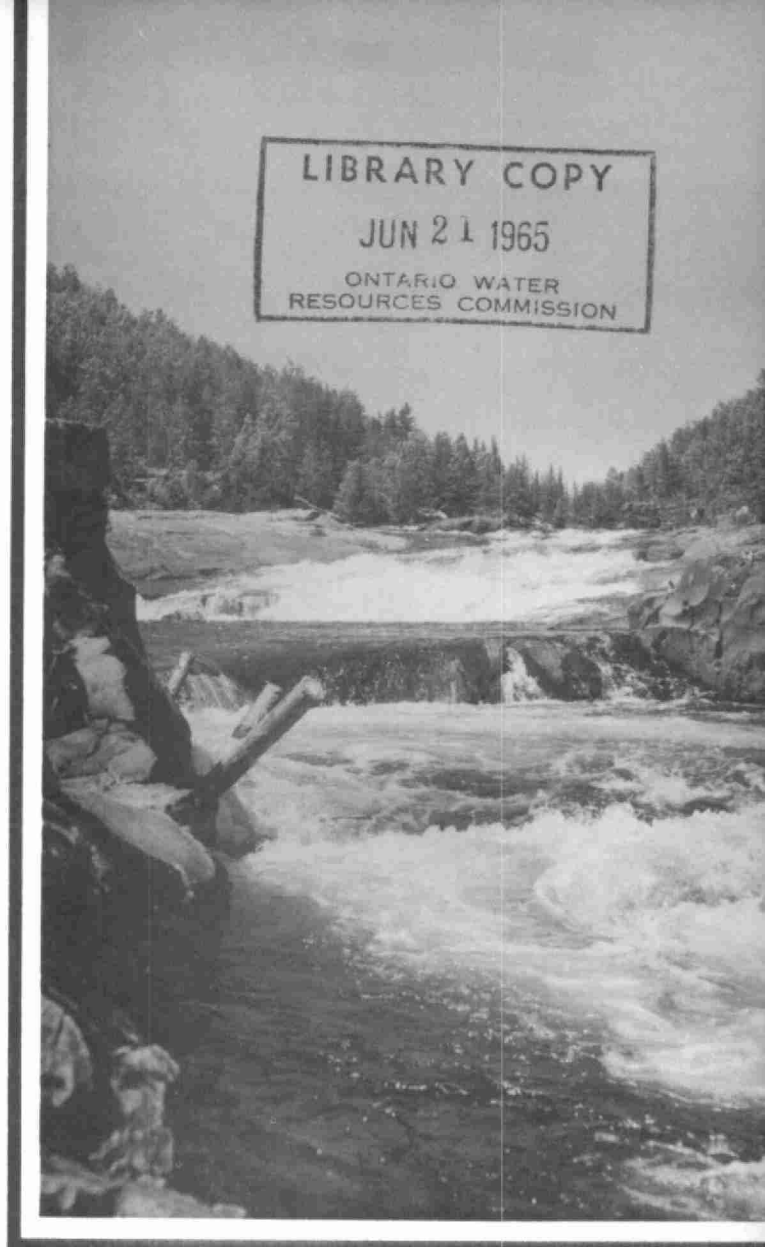


*Orangeville
Sewage
Treatment
Plant*



1963 Annual Report

Ontario Water Resources Commission

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ONTARIO WATER RESOURCES COMMISSION

OFFICE OF THE GENERAL MANAGER

Mayor and Members of Council,
Town of Orangeville.

Gentlemen:

I am pleased to submit, for your information, the 1963 Annual Operating Report of the Orangeville Sewage Treatment Plant, OWRC Project No. 58-S-16, which has been prepared by our Division of Plant Operations.

We are grateful for the kind cooperation which you and your staff have extended to our Operations staff throughout the year. We look forward to a continuing close association with you in our mutual endeavour to control pollution.

Yours very truly,

A handwritten signature in dark ink, appearing to read "D. S. Caverly".

D. S. Caverly,
General Manager.



General Manager,
Ontario Water Resources Commission.

Dear Sir:

It is with pleasure that I present to you the Annual Report of the operation of the Orangeville Sewage Treatment Plant, OWRC Project No. 58-S-16 for 1963.

This report presents design data, outlines operating problems encountered and summarizes in tables, charts and graphs all significant flow and cost data.

Yours very truly,

B. C. Palmer,
Director,
Division of Plant Operations.

foreword

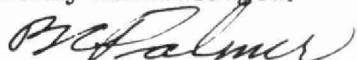


This report is designed to present the highlights of the operation of these works during 1963. Trends in flows and other operating data can be extremely useful in the development of necessary long range enlargement and improvement programs.

In addition to the activities reported herein, much unrecorded effort has contributed to the success of this operation. The municipality, through representatives on the Local Advisory Committee, has given valuable assistance in reviewing salary schedules, detailed operating budgets, personnel problems, flow patterns, and major maintenance problems.

The Division of Plant Operations has provided direction to the field staff in administrative procedures, quality control, maintenance schedules, equipment inspection and purchase supervision. A number of other Divisions of the Commission have been of service. The Division of Construction has offered helpful advice on equipment selection and renovation problems. The Division of Sanitary Engineering has maintained, through its District Engineering staff, a keen interest in the operation and has made a number of constructive recommendations. Its operator training courses have been very helpful. The Division of Finance has processed many payrolls, purchase orders and invoices dealing directly with this project. The Commission Personnel Director has been most helpful in the selection of new staff.

The excellent cooperation of all of these groups is gratefully acknowledged.



B. C. Palmer,
Director,
Division of Plant Operations



DIVISION OF PLANT OPERATIONS

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C. W. Perry
Assistant Director
A. C. Beattie
Regional Supervisor
A. Clark
Operations Engineer

ORANGEVILLE SEWAGE TREATMENT PLANT

OPERATED FOR

THE TOWN OF ORANGEVILLE

BY

THE ONTARIO WATER RESOURCES COMMISSION

CHAIRMAN

A. M. Snider

COMMISSIONERS

W. D. Conklin, Q.C.
J. H. H. Root, M.P.P.
J. A. Vance, LL. D.
A. A. Wishart, Q.C., M.P.P.

GENERAL MANAGER

D. S. Caverly

ASSISTANT GENERAL MANAGERS

G. M. Galimbert
L. E. Owers

COMMISSION SECRETARY

W. S. MacDonnell

1956^{to} 1963 History

INCEPTION

In October 1956 the Town of Orangeville initiated plans with the Ontario Water Resources Commission for an expansion of their existing Sewage Treatment Plant. The firm of Proctor and Redfern of Toronto was engaged to prepare plans and specifications for the project.

TOTAL COST

\$175,531.14.

APPROVAL

In October 1956 the municipality signed an agreement with the Ontario Water Resources Commission to construct and operate the expanded plant.

CONSTRUCTION

The contract was awarded to the low bidder Frid Construction Limited and work commenced in August 1959 and was completed December 1960.

Project Staff

CHIEF OPERATOR

Mr. Clarence Clarke, the Chief Operator at the Orangeville Sewage Treatment Plant joined the Commission in May 1960. He has proved to be an able and conscientious worker and is to be commended for the efficient and economical operation of the plant.

Mr. Clark has successfully completed the Sewage Operators' Courses offered by the OWRC and holds the senior certificate.

Description of Project

INFLUENT WORKS

The sewage enters the plant by means of a 30" diameter sewer and is coarsed screened to remove large objects which might damage equipment. It is then pumped by two raw sewage lift pumps to a grit channel which reduces the flow velocity sufficiently to allow the grit to settle out.

The raw sewage then flows to the primary sedimentation tank.

PRIMARY SEDIMENTATION TANK

The primary sedimentation tank is designed to provide an adequate detention period to allow the heavier solids to settle out, and for the removal of surface scum and grease. The heavier solids which settle out to the bottom of the tank and surface scum are collected and pumped to a holding tank.

The primary sedimentation tank is designed to provide sufficient detention to allow for the removal of 30 - 35% of the heavy organic material.

The settled waste water flows over the weir, and is split, 170,000 gallons per day flowing to the aeration tank. The remaining bypasses the plant and is chlorinated and flows to the river.

AERATION TANK

Settled sewage flows from the primary sedimentation tanks to the aeration. There it is mixed with activated sludge which is returned from the final sedimentation tanks and aerated.

The aeration sections retain the sewage for 6 1/2 hours at a flow of .170 million gallons per day. Air is supplied by 2 blowers with a total capacity of 460 cubic feet of air per minute.

FINAL SEDIMENTATION TANK

The aerated mixed liquor from the aeration section is retained in the final sedimentation tanks for approximately 2.5 hours at a flow of 170,000 gallons. This allows the activated sludge to settle. It is collected from the bottoms of the tanks and returned to the aeration sections. (Excess activated sludge is returned to the primary sedimentation tanks and is pumped from there to the digester.) The remaining liquid flows over the weirs of the final sedimentation tanks to the chlorine contact chambers.

DIGESTION

There is no controlled digestion at this plant. The sludge from the primary and final sedimentation tanks is pumped to a holding tank where it is held prior to disposal by tank truck.

Design—Data

GENERAL

Type of Plant - Primary treatment, part of effluent is given secondary treatment by the old plant.

Design Population - 7,500 persons

Per Capita Flow - 100 gallons per day

Design Plant Flow - 750,000 gallons per day

Five Day BOD -

Raw Sewage - 200 ppm

Removal - 36%

Suspended Solids -

Raw Sewage - 250 ppm

Removal - 60%

INFLUENT WORKS

Inlet to raw sewage pump well
30 inch diameter sewer pipe.

SCREENING

Coarse Screen (at pump well) - 1960
1.25 in. x 0.25 at 2 inch centres.

Raw Sewage Pump well - 1960
15 ft. x 10 ft. x 8 ft. (overflow)
1200 cu.ft. or 7480 gallons.

Retention - 14.4 minutes at design flow -
750,000 GPD

LIFT PUMPS

Raw sewage lift pumps - 1960
2 - Smart-Turner vertical centrifugal pumps
each rated at 300 GPM at a head of 20 feet.

LIFT PUMPS (Cont'd)

Each is driven by a 3 HP General Electric Motor.
1 Smart-Turner vertical centrifugal pump rated
at 500 GPM at a head of 25 feet and driven by a
7.5 HP General Electric Motor.

GRIT REMOVAL

Grit Channels - 1960
Screens - 1.25 in. x 0.25 in. at 2 inch centres.
Channels - 2 each 25 ft. x 1.896 feet
(top of wall)
Water Depth - 0.366 ft. at 1 fps.

PRIMARY SEDIMENTATION TANKS

Primary Clarifier - 1960
Size - 35 feet diameter by 12 feet deep (S.W.D.)
Capacity - 1520 cu.ft. or 72,000 gallons.
Retention - 2.31 hours at 750,000 GPD.
Surface Settling rate - 780 gals/sq.ft. at
surface area/day.
Weir overflow rate - 7.350 gal/lin.ft. of weir/day.
Raw Sludge pump - 1960
1 - Carter plunger type rated at 75 GPM at a head
of 15 feet and driven by a 2 HP General Electric
motor.
Division Chamber - 1960
divides flow to aeration tanks or chlorine contact
chamber.

AERATION SECTION

Aeration tanks - 1929
Size - 2 tanks each 84ft. x 8 ft. x 8ft. deep.
Capacity - 5380 cu.ft. each or 67,000 gallons
total.
Retention - 6.44 hours at 250,000 GPD.
Air blowers - 1929
2 - Babcock-Wilcox and Goldie-McCulloch
air blowers each rated at 230 c.f.m. at 10psig
and each driven by a Lancashire Dynamo and Cripto
20 HP electric motor
Return Sludge pump.
1 - Smart-Turner pump rated at 75 GPM at a head of
25 feet and driven by a 1.5 HP General Electric
motor.

FINAL SEDIMENTATION TANK

Final settling tanks

Size - 2 tanks each 14 ft. x 14 ft. x 7.5 ft. deep (average liquid depth).

Capacity - 1520 cu.ft. each or 18,950 gallons.

Retention - 1.82 hours at 250,000 gal. per day.

Surface settling rate - 638 gal/sq.ft. of surface area/day at 250,000 gpd.

Weir overflow rate - 1,300 gal/lin.ft. of weir/day at 250,000 gpd.

CHLORINE CONTACT CHAMBER

Chlorine Contact Chamber - 1960

Size - 29.75 ft. x 12 ft. x 6.92 ft. deep (max. liquid depth)

Capacity - 2470 cu. ft. or 15,400 gal.

Retention - 29.6 minutes at 750,000 gpd.

CHLORINATOR

Chlorinator - 1960

1 - Wallace and Tiernan bell-jar type chlorinator with a maximum rated capacity of 75 pounds of Chlorine per day.

MISCELLANEOUS PUMPS

Sump pump in control building.

1 - Jacuzzi Universal submersible sump pump driven by 1/3 HP Jacuzzi Universal electric motor.

Primary Effluent Well Pump

1 - Wemco torque flow pump rated at 150 gpm at a head of 25 feet and driven by a 3 HP General Electric motor.

Sump pump in Old Control Building.

1 - Kenco Multi-Purpose pump rated at 1000 gpd at a head of 15 feet and driven by a 1/3 HP Kenco electric motor.

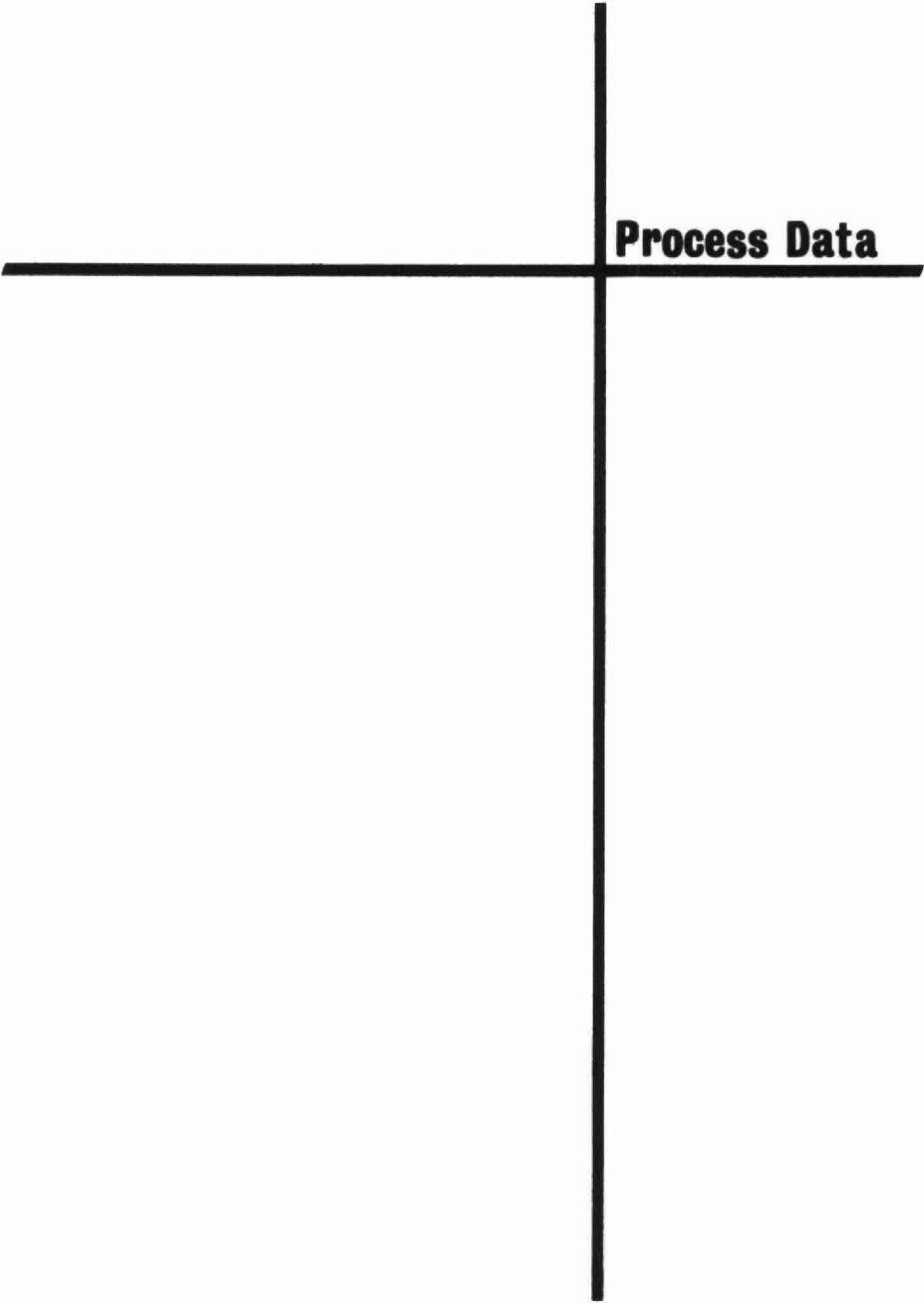
1 - Burgess-Manning Pen Flowmeter with totalizing, indicating and recording attachments.

SLUDGE HOLDING TANK

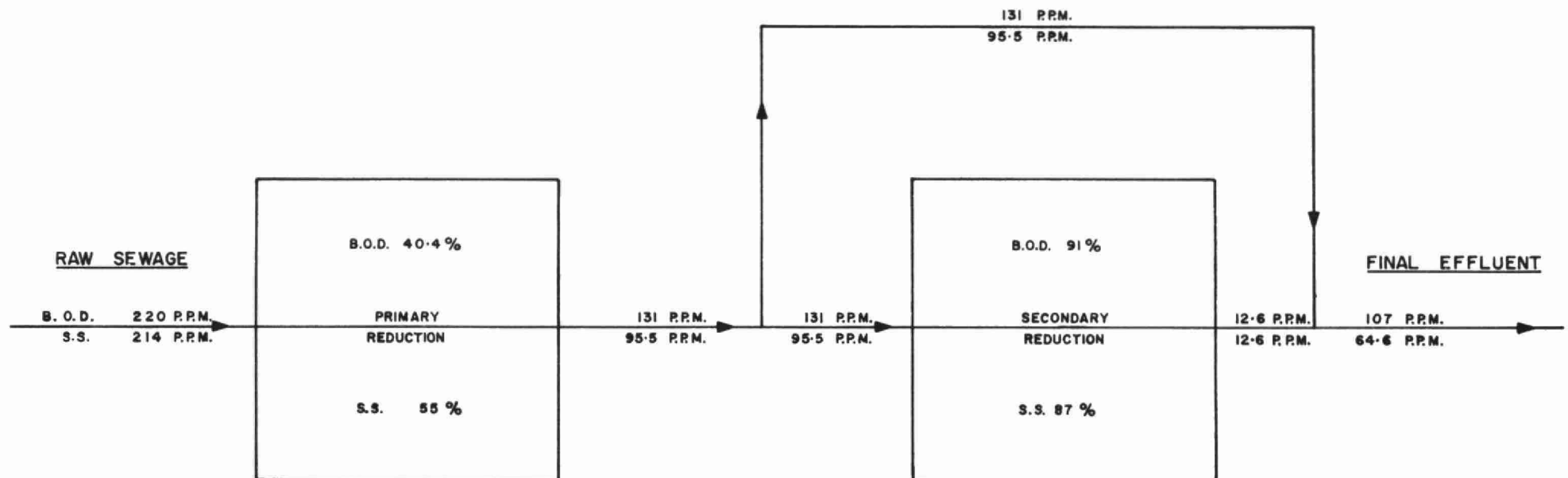
Sludge Holding Tank

Size - 18.5 ft. diameter x 15 ft. deep

Capacity - 4030 cu. ft. or 25,125 gallons.



ORANGEVILLE W.P.C.P.
SCHEMATIC SKETCH SHOWING EFFICIENCIES
OBTAINED BY PRIMARY & SECONDARY UNITS
IN 1963



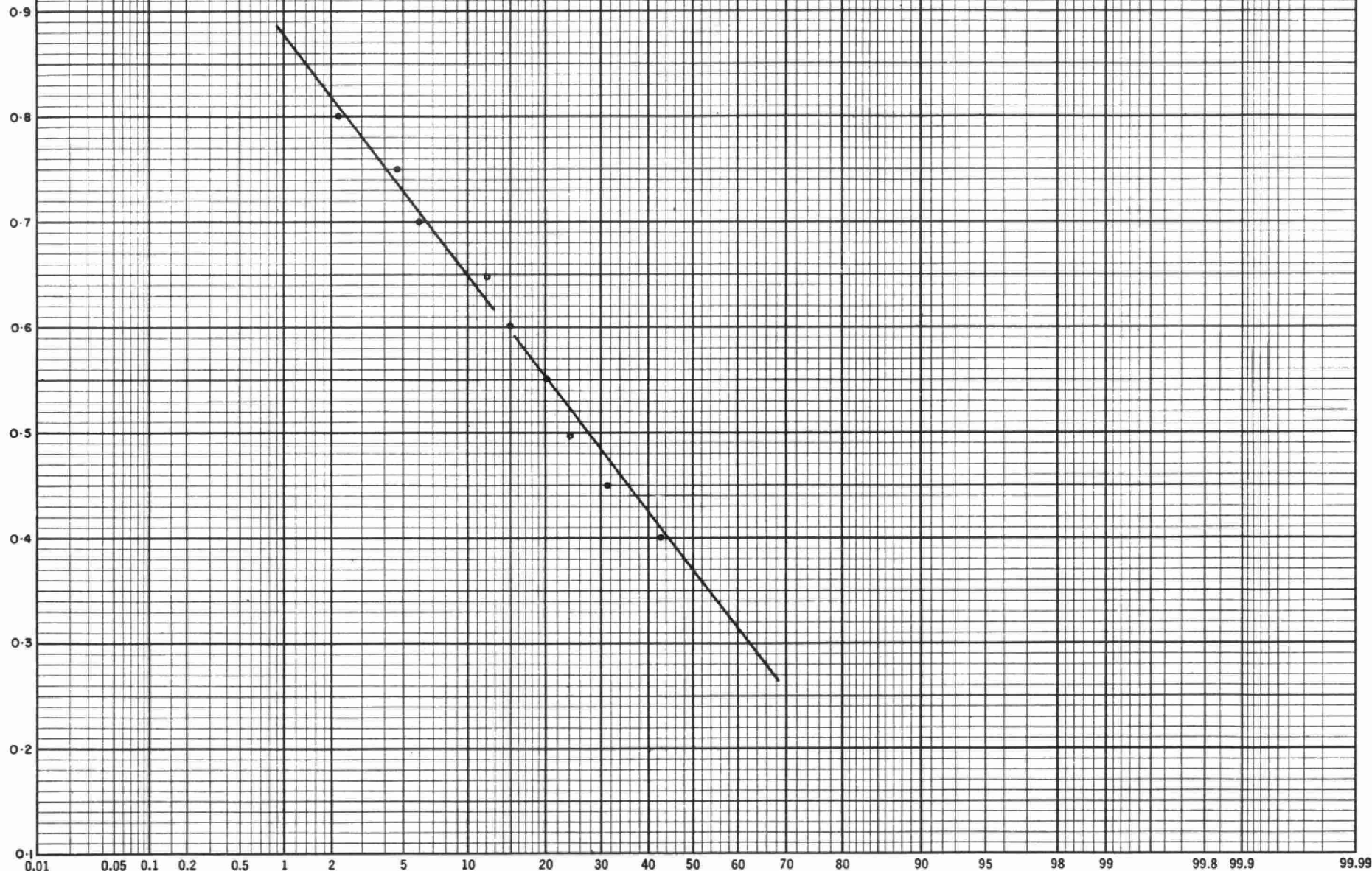
NOTE: OVERALL PLANT EFFICIENCY
B.O.D. = 51.5 %
S.S. = 70 %

ABOVE LOADINGS BASED ON AVERAGE OF SAMPLE RESULTS FOR 1963

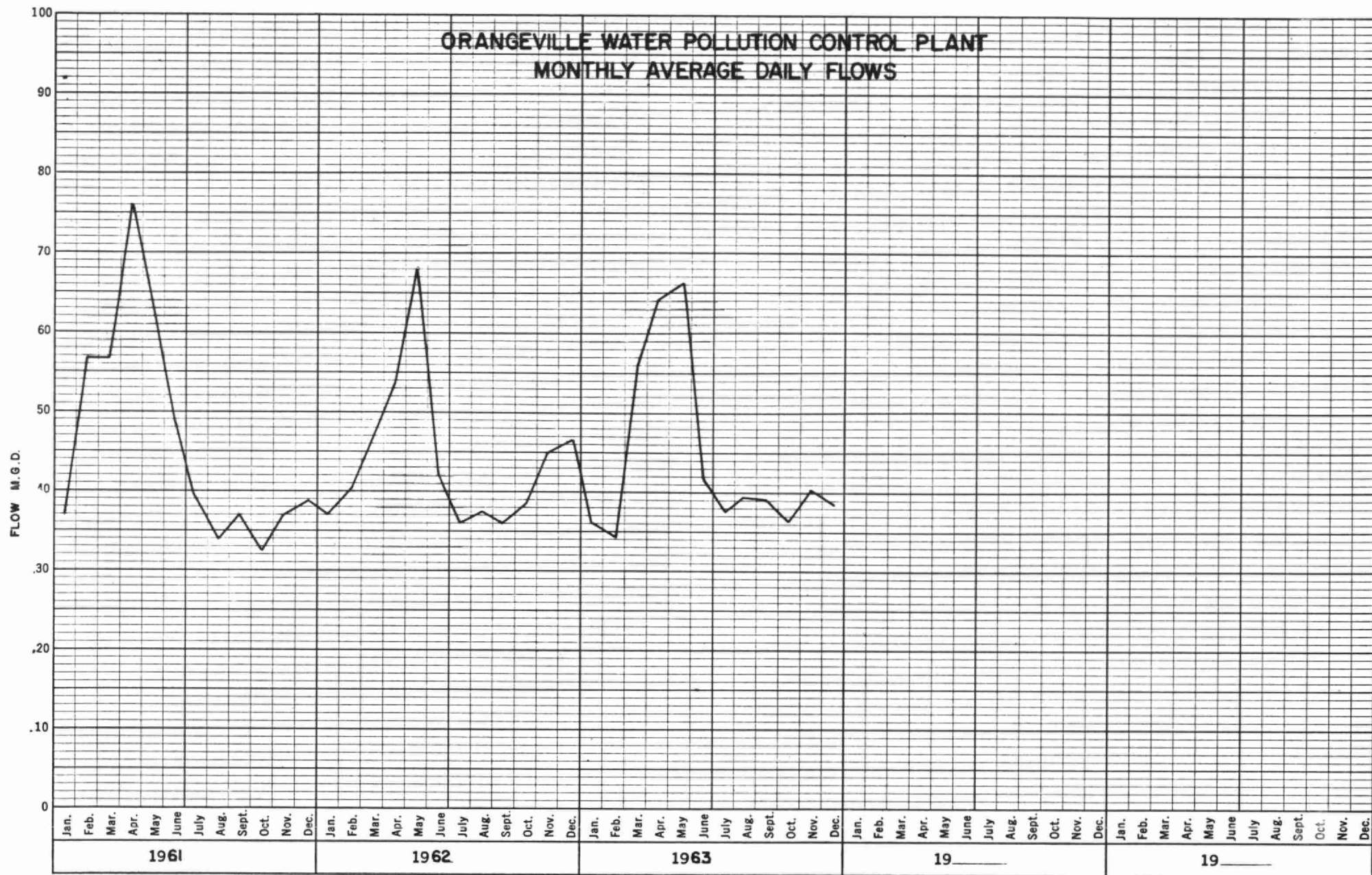
B.O.D. — RAW SEWAGE 220 P.P.M.
S.S. — RAW SEWAGE 214 P.P.M.

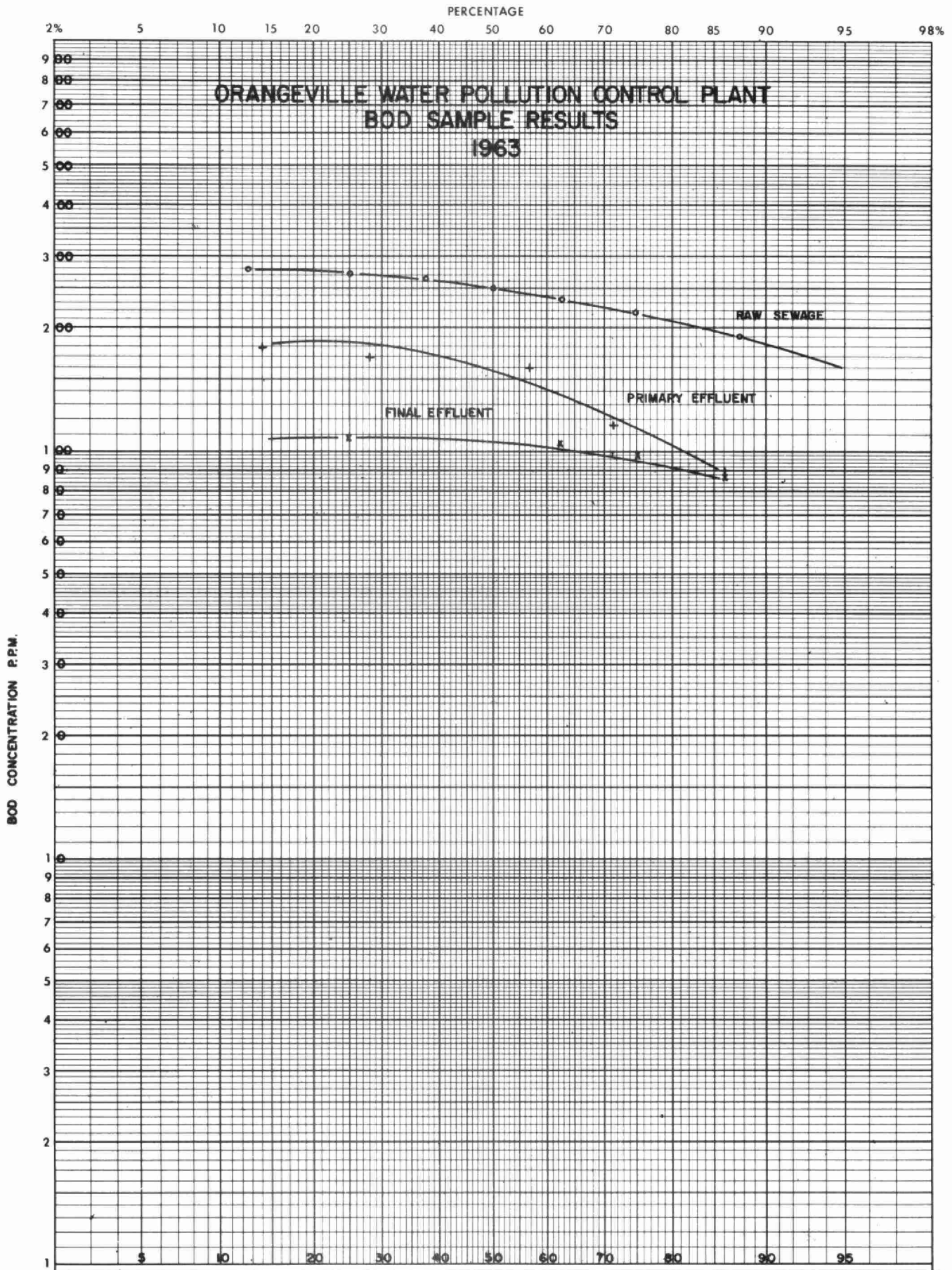
ORANGEVILLE WATER POLLUTION CONTROL PLANT
AVERAGE DAILY FLOWS

FLOW — MILLIONS OF GALLONS

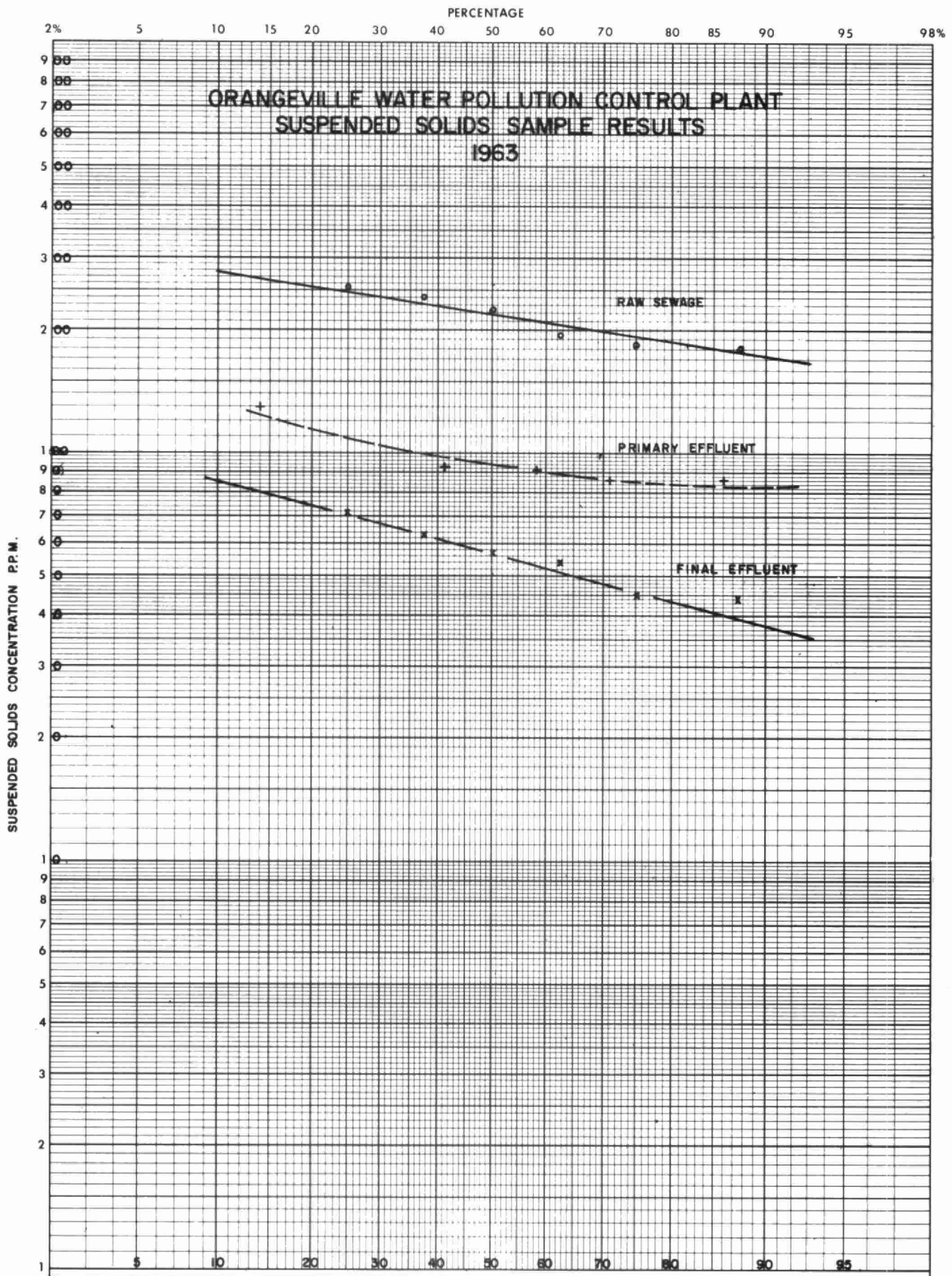


% TIME FLOW IS EQUAL TO OR GREATER THAN





PERCENT TIME BOD IS EQUAL TO OR GREATER THAN



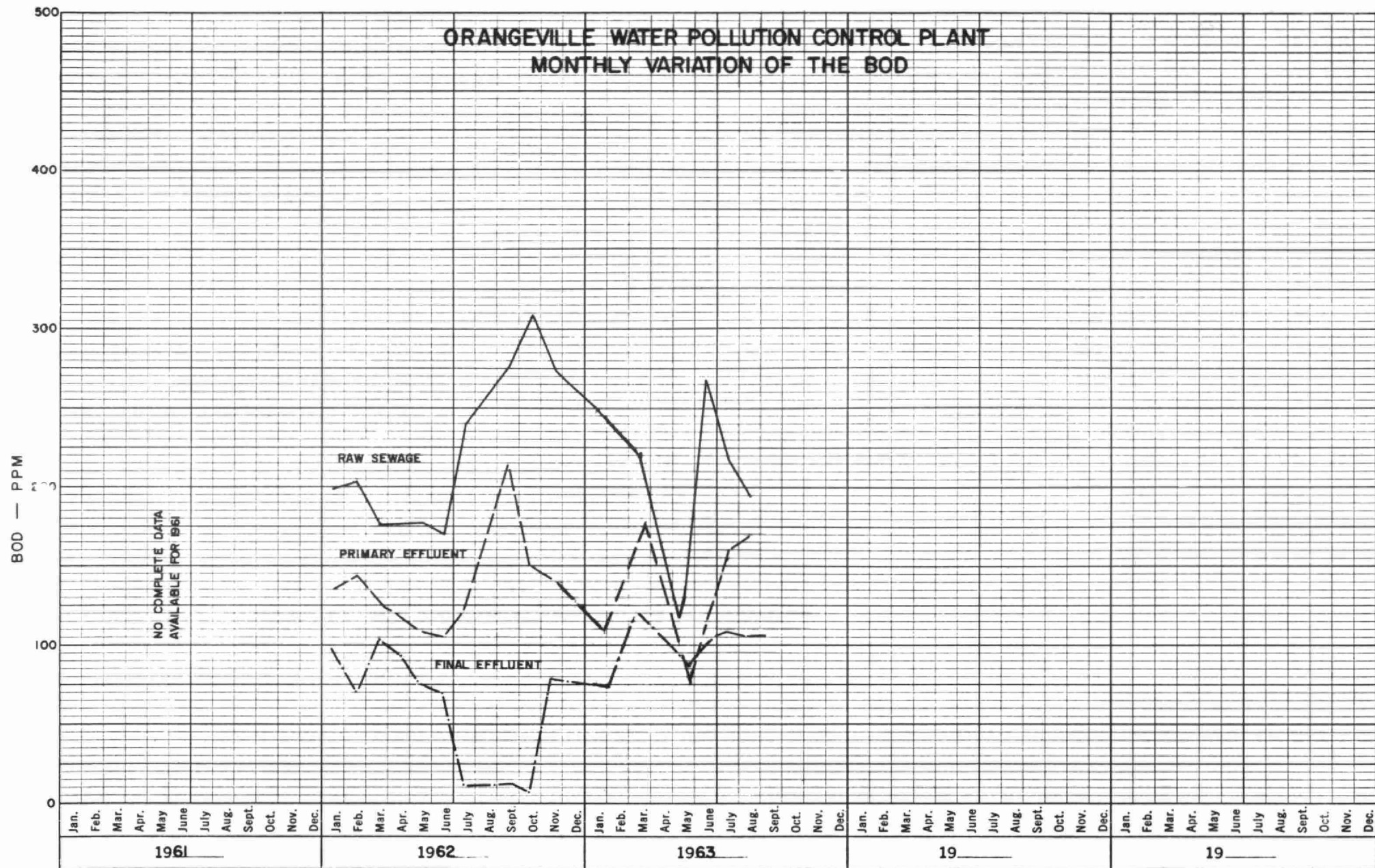
GRIT, B.O.D AND S.S. REMOVAL

MONTH	B. O. D.				S. S.				GRIT REMOVAL CU. FT.
	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	INFLUENT PPM.	EFFLUENT PPM.	% REDUCTION	TONS REMOVED	
JAN.	-	-	-	-	-	-	-	-	-
FEB.	-	-	-	-	-	-	-	-	-
MAR.	-	-	-	-	-	-	-	-	-
APR.	-	-	-	-	-	-	-	-	123
MAY	128	106	17.0	4505	146	92	37.0	11058	290
JUNE	270	106	60.5	20542	197	63	68.0	16783	10
JULY	220	108	51.0	13083	186	42	77.5	16821	233
AUG.	195	106	45.5	10926	260	71	72.5	23202	230
SEPT.	280	90	57.0	18762	181	88	70.0	14892	103
OCT.	235	98	58.0	15497	224	45	80.0	20249	-
NOV.	-	-	-	-	-	-	-	-	112
DEC.	265	106	60.0	18946	254	57	77.5	23475	-
TOTAL									1101
AVG.	228	103	54.8		207	65	68.5		

COMMENTS

During the year 1963 a total of 1101 cu.ft. of grit was removed at the plant. This represents an average of 6.9 cu.ft. per million gallons treated. This figure is considerably higher than the 2.8 cu.ft. per million gallons treated in 1963, and indicates that a regular sewer cleaning program to alleviate the problem should be considered.

Damage to equipment because of the large amount of grit was considerable in 1963, the motor on the primary clarifier burning out twice and the lift pumps requiring repairs.



AERATION SECTION

MONTH	PRIM. EFFL. B.O.D. PPM.	MLSS. PPM.	LBS. BOD. PER 100 LBS. M. L. S. S.	CUBIC FEET AIR PER LB. B.O.D. REMOVED
JANUARY	108	1464	(13)	2130
FEBRUARY		1394		
MARCH	180	1171	27	1340
APRIL		957		
MAY	114	665	22	2010
JUNE	116	1316	16	1900
JULY	160	1452	20	1385
AUGUST	170	1167	26	1310
SEPTEMBER	90	1163	(15)	2790
OCTOBER	180	1371	24	1360
NOVEMBER	160	1137	25	
DECEMBER	160	1310	22	1400
TOTAL				
AVERAGE	144	1214	24.0	1736

COMMENTS

The aeration section at this plant is capable of handling 170,000 gallons per day or 39% of the 1963 average daily flow.

Examination of the data for the aeration section indicates that the MLSS averaged 1214 ppm, while the BOD per 100 pounds MLSS averaged 24.0 pounds. The air required at this plant is higher than usual for the loadings experienced and is due to the obsolescence of the aeration section.

CHLORINATION

MONTH	PLANT FLOW (MG)	POUNDS CHLORINE	DOSAGE RATE (PPM)
JANUARY	11.189	706	6.4
FEBRUARY	9.597	654	6.8
MARCH	17.328	724	4.2
APRIL	19.414	626	3.2
MAY	20.479	1200	5.8
JUNE	12.525	1079	8.6
JULY	11.681	1120	9.6
AUGUST	12.276	1107	9.0
SEPTEMBER	11.726	1081	9.2
OCTOBER	11.312	1083	9.5
NOVEMBER	12.102	1009	8.4
DECEMBER	11.916	1026	8.6
TOTAL	161.545	11415	
AVERAGE	13.462	951	7.0

COMMENTS

Chlorination is carried out throughout the year at this plant. During 1963 a total of 11,415 pounds of Chlorine were required to treat 161.5 million gallons. This represents an average dosage of 7.0 ppm which was necessary as a large proportion of the plant effluent (61%) received primary treatment only.

1963

PLANT

Total Operating Costs

MONTHLY

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIPMENT	REPAIRS & MAINTENANCE	SUNDRY	WATER
JAN	816.97	336.70		76.58	108.23	115.88	12.74			166.84	
FEB	1224.83	319.87		25.87	112.68	115.88	14.33	324.52	45.08	266.60	
MARCH	886.00	318.00		84.26	94.92	115.88	15.50			257.44	
APRIL	769.27	377.81			111.95	115.88	20.61		3.48	139.54	
MAY	1076.43	369.00		23.10	103.44	188.52	13.15			399.22	
JUNE	661.65	330.20		21.60	110.86	139.05	52.44			33.78	
JULY	1481.77	495.30		26.39	95.12	278.10	68.21	82.52	71.03	365.10	
AUG	639.96	372.88			132.11	(160.93)	18.06		40.59	237.25	
SEPT	1702.65	330.20			95.42	518.12	19.65	91.46	24.91	622.89	
OCT	1008.76	330.20			117.99	349.05	61.77	72.13	65.22	12.40	
NOV	1610.24	334.08			97.83	(70.95)	63.76	4.61	35.00	1145.91	
DEC	1469.34	567.08		27.68	111.75	278.10	(28.28)			513.01	
TOTAL	13347.87	4481.32		285.48	1292.30	1982.58	331.94	575.94	285.31	4113.70	

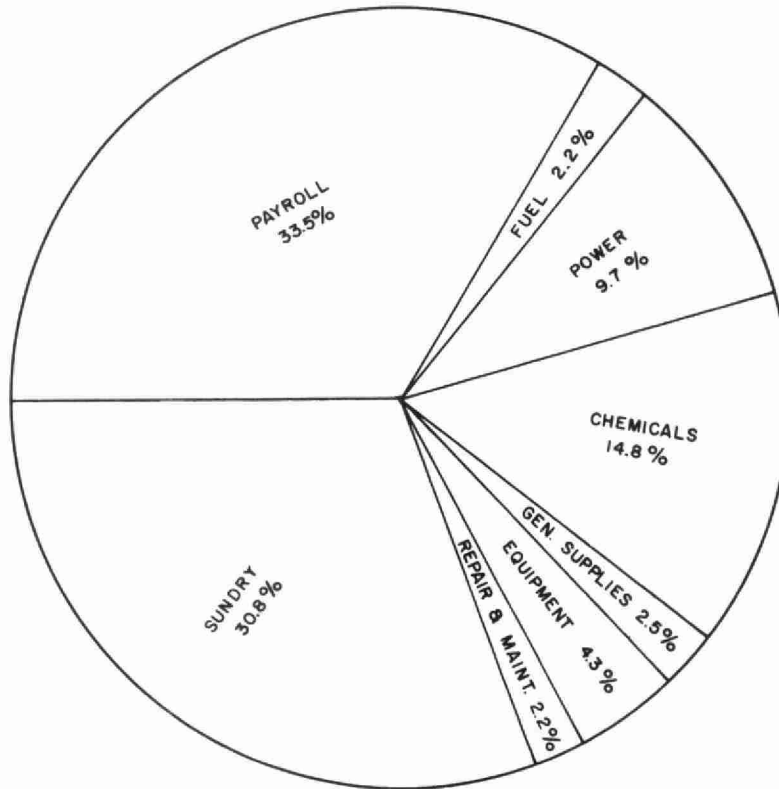
PLANT

YEARLY

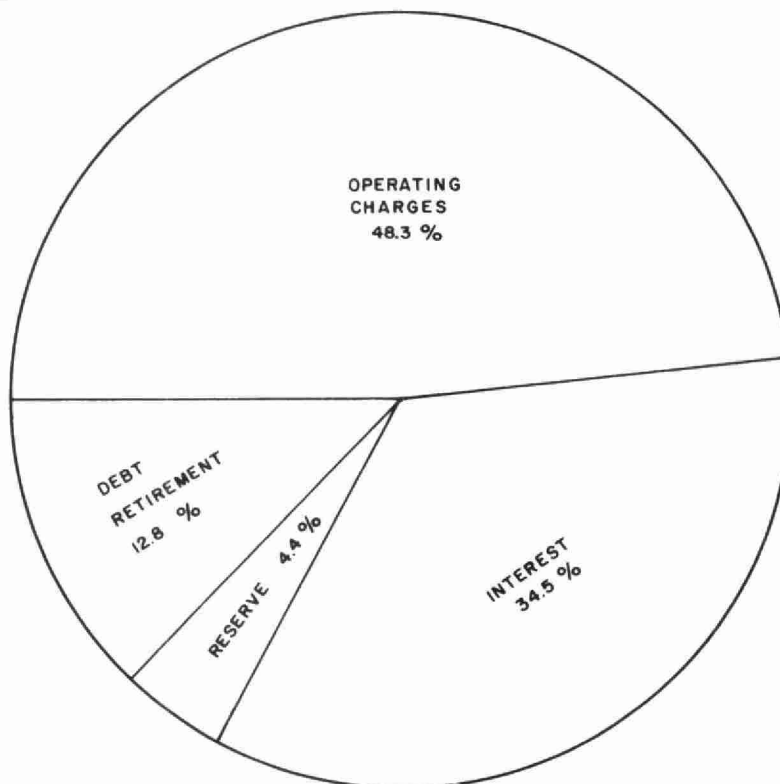
YEAR	M.G. TREATED	TOTAL COST	COST PER MILLION GALLONS	COST PER CAPITA PER YEAR *
1961	168,643	\$12,992.61	\$77.00	\$2.80
1962	161,630	\$10,616.07	\$65.80	\$2.26
1963	161,545	\$13,347.87	\$82.60	\$2.70
* BASED ON ASSESSED POPULATION OF 4,934				

ORANGEVILLE

OPERATING COSTS



TOTAL COSTS



SUMMARY

This report has given in detail the significant data on the operation of the various treatment units at the Orangeville Sewage Treatment Plant.

It should be noted that the average flow through the plant is approximately 0.4 million gallons per day and that the capacity of the aeration section is 0.20 MGD. This overloading has required considerable bypassing of this unit, in order to maintain stable operating conditions. The strong primary effluent mixed with the relatively weak final effluent has resulted in a final effluent with a high BOD and suspended solids concentration.

It is interesting to note that the yearly average of BOD and suspended solids of the secondary effluent is 12.6 ppm, below Ontario Water Resources Commission maximum of 15 ppm. This points out the fact that the plant is operating satisfactorily and that the effluent would be satisfactory if the aeration section of the plant were expanded.

Under the supervision of head office engineers, the plant staff has operated and maintained a clean attractive and efficient plant for the Town of Orangeville.



Total 1963 Costs

The total operating cost to the municipality during 1963 was \$13,347.87. This represents a cost of \$82.70 per million gallons treated. On the basis of the population 4,934, the per capita operating cost was \$2.70.

The total cost to the municipality during 1963 was as follows:-

Operation	\$ 13,718.57
Debt Retirement	\$ 3,639.00
Reserve	\$ 1,245.00
Interest	\$ 9,791.57
TOTAL	<u>\$ 28,394.14</u>

On the basis of the population of 4,934, the total cost to the municipality of this project in 1963 was \$5.75.

As of December 31st, 1963 there was a total of \$3,620.13



Division of Plant Operations

ONTARIO WATER RESOURCES COMMISSION
801 BAY ST. TORONTO 5